High Performance Requires Efficiency

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The concept of high performance challenges us to design and build structures that integrate and optimize all the relevant attributes of high performance and sustainability on a life-cycle basis. A main part of this is the optimization of a project, which requires efficiency in design, construction, and operations.

The first step is to look for ways to optimize the design, reducing both the amount of materials used and the construction complexity, as complex projects usually have greater costs and associated risks. Reducing complexity involves minimizing interfaces and related details. These are usually locations where installation of the details may be performed incorrectly and/or require more maintenance. These are also locations where buildings leak air, moisture, and consequently heat, which reduces efficiency and overall building performance while increasing life-cycle costs.

Integrating systems can boost efficiency. For example, precast concrete can combine several finishes into one panel—such as brick, stone, and trim (lintels, window sills, etc.). Instead of joining three materials that require interface detailing, they are monolithically combined into one high-strength concrete panel during the casting process. Also, since precast concrete is a continuous air and vapor barrier and can include continuous insulation, six building components have been combined into one unit. That's pretty efficient.

The construction process should also be optimized, speeding construction and minimizing the project's footprint. Optimization can help reduce negative effects to the environment as well as to the project. Systems such as precast concrete that are fabricated offsite and installed quickly facilitate fast project completion and, in some cases, generate revenue faster.

Building operations really consume costs, through electricity and other resources. Therefore, high performance buildings are designed to perform beyond baseline code requirements. Materials used in construction should contribute to reducing the consumption of energy and other resources related to operations. When you combine the thermal mass, continuous insulation, and negligible thermal bridging of precast concrete envelopes, the result is a reduction in energy used to heat and cool a structure, as well as a potential to reduce initial costs of HVAC equipment.

The articles in this issue provide examples and details on these topics and highlight ways that designers have taken advantage of precast concrete's efficiency. Precast is one of the fastest building systems—it reduces materials, trades, detailing, and associated risks, and it improves a building's thermal performance. It serves as a great example of a high-performance material that integrates and optimizes many attributes into one system efficiently. Let's *Discover High Performance Precast!*

ASCENT **On the cover: Georgia State's University Commons 2000-bed residential hall**

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